Scientific report for IODP^3 – NSF Expedition 501

New England Shelf Hydrogeology

Weekly report – 28th January to 3rd February 2026

1. Location

Bremen Core Repository, MARUM – Center for Marine Environmental Sciences, University of Bremen, Germany.

2. Activity summary

Week 3 began with core processing for Hole M0112A which was completed on the 30th January, after which work continued on Hole M0112B. By the 2nd February, core processing for Site M0112 was finished and core splitting, analysis and description commenced on the final location, Site M0113. On Thursday, 29th January, scientific summaries for the Site M0111 Summary Meeting were presented. The manuscripts for the IODP^3 Proceedings Site Reports paper for Site M0111 were submitted on Friday, 30th January, and are currently under review by Co Chiefs and EPMs. The Methods papers for all disciplines were reviewed and provided with comments. The Science team also began preparing the scientific summaries for the Site M0112 Summary meeting, scheduled for Thursday, 5th February, and are actively working on the corresponding manuscripts, which are scheduled to be submitted by 6 pm on the 5th of February. Across the first three weeks, a cumulative total of 719.94 metres has been split, analysed, and described, and 1325 samples were collected during Week 3 (Table 1).

Hole	Total core length (m)	Split core described (m)	Total samples recovered
M0111A	50.37	50.37	178
M0111B	201.33	201.33	889
M0111C	65.57	65.57	201
M0112A	255.96	255.96	579
M0112B	58.52	58.52	245
M0113A	241.49	87.65	501

Table 1 – Progress summary (cumulative) for Week 3 (28th January to 3rd February 2026)

3. Scientific assessment

The sedimentology and lithostratigraphy team completed visual core descriptions and smear slide analyses at Site M0112. Core recovery and quality were excellent, allowing clear identification of diagnostic sedimentary features. Four major sedimentary packages were defined based on pronounced lithological changes, which broadly correspond to unconformities identified in the seismic data, as also observed at Site M0111. Sediments above the seismically interpreted unconformity Unit 2 (U2) are dominated by sands and include shell-rich intervals, whereas sediments below U2 are predominantly mud-rich. A third lithologic unit (U3) comprises heterolithic successions of black muds and sands. The lowermost lithologic unit (U4) consists of mottled clay intervals interbedded with quartz-rich sands, with the clay intervals displaying a wide range of colours. X-ray diffraction analyses confirmed the mineralogical interpretations derived from visual core descriptions.

Biostratigraphy finished analysing samples from Hole M0111C, which included identification of a few more Cretaceous planktic foraminifera along with Cretaceous nannofossils. The team then completed analysis of 45 samples across the entirety of Hole M0112A and Hole M0112B, which yielded only one foraminifera sample that is Palaeocene in age, in agreement with nannofossils found at the same interval. Biostratigraphic investigation of Site M0113 are underway.

The physical properties team had a busy and productive week. Linescan and colour reflectance measurements were completed for cores from Site M0112 and for the upper part of Hole M0113A. Moisture and density and discrete P-wave samples were routinely taken in both Hole M0112A and Hole M0112B with almost all measurements completed. Undrained shear strength measurements were conducted using a fall cone penetrometer and shear vane apparatus to give two independent measurements for undrained shear strength, ultimately helping to further characterize the properties of the mud-rich lithologies. The team presented an integrated summary of offshore and onshore results at the Site M0111 meeting, including an initial comparison with downhole logging, geochemical, and lithological data. Scanning, sampling, and discrete measurement continued as the team worked on finalizing their Methods section and their initial draft of their Site M0112 report.

The geochemistry team focused on the analysis of interstitial water samples from Sites M0111, M0112, and M0113. Analyses were conducted using an ion chromatograph (IC), an inductively coupled plasma–optical emission spectrometer (ICP-OES), and a spectrophotometer. These analyses yield concentrations for anions (e.g. chloride, bromide, sulphate), major and minor elements (e.g. calcium, magnesium, iron and manganese), and sulphide, respectively. Each dataset underwent a thorough quality check, and analyses are currently being repeated for selected samples from the freshened water intervals, since these require less dilution than samples with seawater salinity. In addition, 54 samples of drilling mud were filtered and prepared for analysis. Drilling mud samples were taken frequently during the Offshore Operation to allow assessment of potential contamination that arises from the contact of sediment cores with drilling fluid. The drilling mud samples are being analysed with the same method used for interstitial water samples. In addition, the geochemists continued processing sediment samples that were taken from the split cores for onshore geochemical and mineralogical analysis. At this point, 90% of the expected samples have been taken, and 72% have been freeze-dried, homogenized, split into subsamples, and prepared for mineralogical and chemical analyses of the solid phase. With these data, the geochemists have started working on the layout of tables, figures, and site chapters for the Expedition Report.

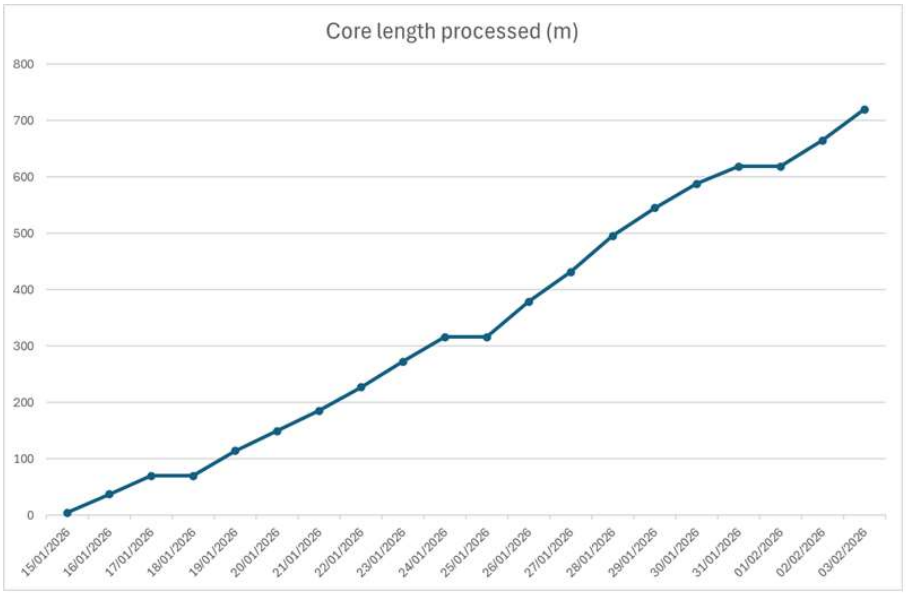

Figure 1 – Core progress chart (from the Onshore Operation start date 15/01/2026 until 22:30, 03/02/2026)

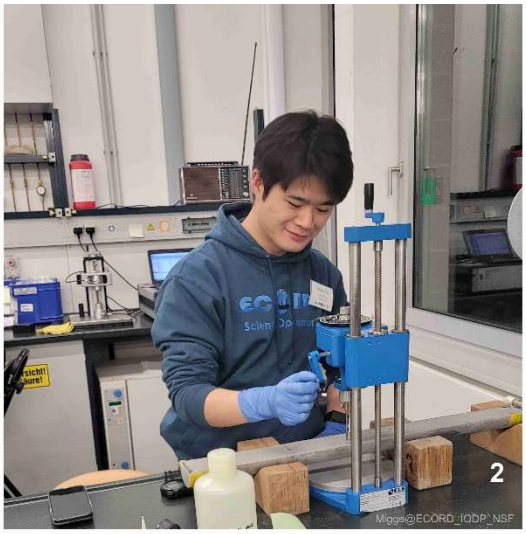

Photo 1. Bremen student assistants Atlas Maisel and Carolina Teixeira splitting a core (Le_Ber@ECORD_IODP^3_NSF_P1054974)

Photo 2. Scientist Shuai Feng measuring shear strength properties (Migge@ECORD_IODP^3_NSF_11)

Photo 3. ESO team member Andrew McIntyre analysing a core for its colour reflectance (Pachiadaki@ECORD_IODP^3_NSF_IMG_0524)

Photo 4. Formation factor measurement ongoing (Le_Ber@ECORD_IODP^3_NSF_P1054924)